

1x2 Prototype PEPC for the NIF*

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A large aperture optical switch based on plasma electrode Pockels cell (PEPC) technology is an integral part of the NIF laser design. This optical switch will trap the input optical pulse in the NIF amplifier cavity for four gain passes and then switch the high-energy output optical pulse out of the cavity. The switch will consist of arrays of plasma electrode Pockels cells working in conjunction with thin-film, Brewster's angle polarizers.

The 192 beams in the NIF will be arranged in 4x2 bundles. To meet the required beam-to-beam spacing within each bundle, we have proposed a NIF PEPC design based on a 4x1 mechanical module (column) which is in turn comprised of two electrically independent 2x1 PEPC units.

In this paper, we report on the design and initial results of a single 2x1 prototype module. The purpose of this prototype is to prove the viability of a 2x1 PEPC and to act as an engineering test bed for the NIF PEPC design.

Important design features of our 2x1 prototype include insulated aluminum housings, vacuum pumping through the electrodes, uniform-width narrow plasma channel, and beveled edge windows. Aluminum construction replaces the polyethylene construction used on the highly successful Beamlet PEPC and offers low-risk, low-cost manufacturing with scalability to the full 4x1 NIF module. We will employ an insulating coating on the aluminum to achieve a uniform plasma discharge. A narrow plasma channel is predicted by our fluid code to provide a relatively high edge density which will facilitate uniform voltage application to the KDP crystals. A beveled edge window design helps realize a uniform width plasma channel and also reduces tensile stress in the windows. Pumping through the electrodes is required for the dense NIF design.

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